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DEPARTMENT OF AGRICULTURE,
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Miscellaneous Publication, No. 103.

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From Agricultural Gazette of N. S. Wales.

September, 1896.

The Common Crow.

By N. A. COBB.

I stand up for the crow. It is high time he was let alone. We know better, or we ought to know better, than to go on killing crows, nevertheless we continue to kill them indiscriminately. The simple truth is that crows do man more good than harm, and that of the two, man and crow, the former is showing himself to be the more stupid and the more blind to his own welfare.

The crow is the victim of unreasoning human prejudice, which is about the biggest misfortune that can befall anybody or anything. To begin with, the crow is black, and that alone puts him at a disadvantage at first sight. Then his breath smells bad, and he sings out "Ah!" "Ah!" in a tone of voice that the guilty or supersensitive conscience of nine men out of ten construes into a direct personal insult.

What business has the crow to know too much to come within sixty yards of a gun?—for it is a notorious fact that he is often a better judge of the range of the sportsman's gun than the sportsman himself. His superior prowess makes him unpopular with sportsmen and all others who attempt to shoot him. People don't like to be outwitted, and are wont to vent their spleen on the intelligence that outwits them. The crow is too sharp. If he would only be so amiable as to allow himself to be shot oftener by blunderers with a gun he would become less unpopular.

It is a slight blot on the intelligence of the crow that he takes so little pains to conceal the fact that he gets up early. Most people don't see the sun rise once a month. They know that they would be much better off if they did, and they therefore soon get a grudge against any one who, by his exemplary habit of early rising, constantly reminds them of their own deficiencies. Therefore, all early risers who are wise should keep this virtue a secret, and not flaunt it in public. Herein the crow fails. He gets up before sunrise and often makes a great hubbub about it. Then he goes and does some piece of mischief in the back yard, which makes you feel that it would not have happened if you had been up early, as you know you ought to have been. This makes you uncomfortable, and gives you a spite against the crow.

The celebrated Henry Ward Beecher long ago remarked that if men were feathered out and given a pair of wings, a very few of them would be clever enough to be crows. Most of us, it would seem, according to this authority, would be only fit to become common or garden sparrows, the high station of crow being reserved for geniuses, prime ministers, and other greatnesses.

Everybody is down on the crow. From our legislators, who frame laws against him, and our commissioners, who put a price on his head, to the boy who vainly tries to bring him down with a gun, there comes a chorus of disapproval, and yet few can tell why all this odium is heaped upon the crow. In the tirade against him bad words are more common than good reasons. A thing in his favour is almost unheard of. The uninformed, therefore, naturally come to the conclusion that the crow is thoroughly bad, and as black in character as he is in plumage.

To say a word in favour of the crow is to become a target for ridicule, and to seriously take up his defence is to be at once set down by many people as either a faddist or a fool. For all that, the crow does not lack friends, and these are rapidly increasing in number and strength.

Throughout the world the crow is the same black, gregarious, intelligent bird. Though the common European, American, and Australian crows are reckoned as three distinct species, it requires an expert to distinguish one from the other quickly and with certainty, and the similarity in their outward appearance is sustained by internal resemblance and identity of habits. The voice, nest, food, tricks of flight, and other traits of the different species of common crow are so much alike that whatever of importance is found true of one species is sure to be essentially true of all the others. I am sure that all ornithologists who have carefully observed, as I have done, the habits in the wild state of the three species of crow mentioned above, will agree with me in saying that the differences among them, though sufficient to justify their separation into three distinct species, are after all trifling. I may illustrate my meaning more clearly by saying that if a new island continent, similar to Australia, were discovered, and explored by a competent zoologist, such a person on examining a single dead common crow from this new continent could say with great certainty, " This species will be found to be omnivorous but fond of insects, especially grasshoppers ; a hunter of rabbits and similar small mammals, especially when young ; a robber of birds' nests ; gregarious ; secretive ; highly intelligent ; without objection to carrion ; possessed of a song that consists simply of a repetition of the guttural syllable 'Caw' or 'Aw,' with a variety of accent,"—in short, he would be able, from his positive knowledge of the great similarity among the different species of common crow, to give a tolerably accurate picture of the habits of this new crow.

Of course, these remarks apply only to the common crow. They would not apply to those aberrant species of crow occurring here and there over a limited area in different countries. Such aberrant species commonly have habits which are distinctly different from those of the common crow occurring on the same areas.

Let anyone who doubts the very great similarity existing among the common crows of the different continents compare the following description by Samuel N. Rhoads of the roosting habits of the American crow, with what may be observed wherever Australian crows congregate to roost :—

" The course adopted in assembling to and departing from the chosen spot is uniform everywhere. About an hour before sunset stragglers begin to appear, reconnoitering, as it were, to see that the coast is clear, and returning whence they came, as if to inform the main body of the result. In the course of half an hour the flocks begin to arrive in broken lines and detachments from all quarters, and, if the evening be calm, their earthward descent from a height of many hundred feet exhibits aerial prowess surpassing in daring elegance those of any other land bird with which I am acquainted. It is their invariable custom to descend to some spot in the neighbourhood, from one-half to a quarter of a mile from the roost, preliminary to assembling there for the night's repose. This may be either upon the adjoining fields or on the woodland tracts near by. Such preliminary gatherings, as Godman observes, seem to have a definite object—either for toilet or gastronomic purposes—a time, also, if we may judge by their clamour, of general conversation, some rejoicing, some repining, in their varied experience of the last twelve hours.

"The aerial evolutions of this descending multitude, coupled with the surging clamour of those which have already settled as successive re-enforcements appear, and which at a distance greatly resemble the far-away roar of the sea, may justly awaken emotions of sublimity in the spectator. To descend almost perpendicularly from a height of 1,000 feet above earth to the very tree tops and then to glide above them on half-closed wings with a resultant momentum that is almost startling in its arrowy velocity, is a favourite manœuvre and when two such playfellows pursue each other in this headlong swoop their turnings and twistings and doubling contortions amaze the beholder. * * * Until sunset this novel scene continues without interruption, whilst field and forest in the vicinity of their great dormitories are shrouded by the thousands which have alighted; and were it not for the deafening clamour, the living pall which overspreads the scene might well suggest a land of mourning and death. When they settle on the ground on such occasions they resemble gulls on a sand-bar, each standing motionless with its head toward the breeze. The whole thing seems unnecessary, as they mostly do nothing but cry out to their companions in the air and tumultuously applaud their hairbreadth escapes and feats of daring, yet sitting quietly until the setting sun warns them to make ready for the last act—going to bed.

"If we understood crow language, perhaps we could now recognise a distinct signal from some grand master of their assembly, summoning all to repose.

"Be this as it may, a similar impulse now seizes the throng and the air fairly darkens as successive companies take wing and in silence betake themselves to the roost, flying low as if to avoid observation. Many crows in approaching the place of preliminary gathering necessarily fly over the roost, but not a bird enters it until the general movement begins after sunset. The self-imposed discipline and obedience of such an army puts to shame the strictest military code. Think now of a miserable, weary crow, which, having winged his way thither a distance of 20 miles, arrives about sunset at the roost; but the ingathering not having yet begun, witness how like a true soldier he flaps on to join his more punctual brethren who have settled half a mile farther off to gossip and plume themselves before retiring.

"On one occasion I observed large companies arriving in the roost near Merchantville, at a time of full moon, for nearly an hour after sunset. Between the intervals of arrival all would become quiet in their bedchambers, but as a more belated company drew near, their cries were responded to by the roosting crows in a different tone. The fliers would hurriedly ejaculate 'yur, yur, yur,' * * * giving each utterance a rising inflection, as if inquiring anxiously of their whereabouts, while those in the roost answered in a falling, drawling tone by slowly repeating their usual 'caw' and lengthening it to 'ca-aw,' 'ca-aw,' 'ca-aw,' as if to assure their friends they were resting comfortably. * * *

"The programme of dispersion from the roost in the morning to their feeding grounds is as follows:—

"After an hour's babel (for such verily is the seeming confusion of tongues) a few crows essay to take leave, but as soon as this folly is observed it literally 'brings down the house,' and when one imagines the simultaneous shout of 20 acres of crows, one may not wonder that 'the house' is fully able to bring down the crows. The few crows resume their perches and comparative quiet is restored.

"Numerous attempts are thus made with a like result until nearly sunrise, when detachments of 500 to 1,000 successfully take wing amid the wildest enthusiasm. These circle and wheel about in headlong swoops and elegant curves above the forest, and each having taken his bearings, moves off in one of the many lines of flight that, eastward, westward, to north and south, extend from the common centre as the spokes of a wheel.

"Ere the sun looks out upon the scene a silence almost oppressive broods over field and woodland, and to one who so recently beheld this departure, a scattered remnant of the mighty host only serves to heighten the feeling of contrasted desolation."

The following scenes too, from the pen of Dr. John D. Godman, may be paralleled easily at almost any bush poultry-yard in Australia:—

"Where food is at any time scarce, or the opportunity for such marauding inviting, there is scarcely a young animal about the farmyard safe from the attacks of the crow. Young chickens, ducks, goslings, and even little pigs, when quite young and feeble, are carried off by them. They are not less eager to discover the nests of domestic fowls, and will sit very quietly in sight, at a convenient distance, until the hen leaves the nest, and then fly down and suck her eggs at leisure. But none of their tricks excited in me a greater interest than the observation of their attempts to rob a hen of her chicks. The crow, alighting a little distance from the hen, would advance in an apparently careless way toward the brood, when the vigilant parent would bristle up her feathers and rush at the black rogue to drive him off. After several such approaches the hen would become very angry, and would chase the crow to a greater distance from the brood. This is the very object the robber has in view, for as long as the parent keeps near her young the crow has very slight chance of success; but as soon as he can induce her to follow him a little distance from the brood, he takes advantage of his wings, and before she can regain her place has flown over her and seized one of her chickens. When the cock is present, there is less danger from such an attack, for chanticleer shows all his vigilance and gallantry in protecting his tender offspring, though it frequently happens that the number of hens with broods renders it impossible for him to extend his care to all. When the crow tries to carry off a gosling from the mother, it requires more daring and skill, and is far less frequently successful than in the former instance. If the gander be in company, which he almost uniformly is, the crow has his labour in vain. Notwithstanding the advantages of flight and superior cunning, the honest vigilance and determined bravery of the former are too much for him. His attempts to approach, however cautiously conducted, are promptly met, and all his tricks rendered unavailing by the fierce movements of the gander, whose powerful blows the crow seems to be well aware might effectually disable him. The first time I witnessed such a scene, I was at the side of a creek, and saw on the opposite shore a goose with her goslings beset by a crow. From the apparent alarm of the mother and brood, it seemed to me they must be in great danger, and I called to the owner of the place, who happened to be in sight, to inform him of their situation. Instead of going to their relief, he shouted back to me to ask if the gander was not there too, and as soon as he was answered in the affirmative, he bid me be under no uneasiness, as the crow would find its match. Nothing could exceed the cool impudence and pertinacity of the crow, who, perfectly regardless of my shouting, continued to worry the poor gander for an hour, by his efforts to obtain a nice gosling for his next meal. At length, convinced of the fruitlessness of his efforts, he flew off to seek some more easily-procurable food. Several crows sometimes unite to plunder the goose of her young, and are then generally successful, because they are able to distract the attention of the parents and lure them farther from their young."

If we compare the insect food of the American with that of the Australian crow, we find a very high degree of similarity indeed. From personal examination of the contents of the stomachs of scores of Australian crows, I can, allowing for difference in the insect species of the two countries, corroborate most of the sentences in the following generalisations of Mr. Schwartz regarding the food habits of the American crow, so far as insects are concerned :—

"1. The insect food of crows is almost exclusively composed of terrestrial species, *i.e.*, such as are found on the surface of the ground, or hide during the daytime at the base of plants or under the various objects lying on the surface; or such as live in the dung of domestic animals, in decaying vegetable and animal matter, or underground.

"There is not the slightest indication that crows catch any insects while on the wing, and the almost complete absence of the numerous arboreal insects of all orders, i.e., such insects as are to be found on, or which live on the trunks, limbs, or leaves of trees and shrubs, indicates that the birds when sitting or resting on trees do not pick up insects.

"The almost constant presence of coprophagous insects in the stomachs indicates that crows preferably frequent dry pasture lands, dry meadows, or very open woods, where cattle or horses are grazing. In many instances the presence of certain species of *Chlœnius*, water beetles, or an occasional aquatic Hemipter or a *Gryllotalpa* or *Corydalus*, &c., shows that the birds frequent the margins of ponds or streams, while in a number of other instances the presence of the larvæ of Lachnosterna, Elateridæ, &c., proves that the crows have followed the plough of the farmer. Many of the terrestrial insects eaten by crows abound during the warmer season in cultivated fields, more especially in corn and clover fields, and have no doubt been picked up by the birds in such localities.

"2. The insect food of the crow consists only of large or medium-sized insects; small species are only rarely, if ever, picked up. The smallest insects found are certain species of *Aphodius*. Ants form a marked exception to this rule, as small, or very small, species are frequently found in many stomachs.

"3. The crow appears to prefer insects with a hard covering to the more soft-bodied ones. Thus the number of the hard imagos of Carabidæ, Elateridæ, Scarabæidæ, Curculionidæ, and Acridiidæ enormously exceeds that of the Coleopterous, Lepidopterous, and Dipterous larvæ found in the stomachs, and no soft-bodied imagos (a few Diptera excepted) seem to be eaten. In many instances, however, this peculiarity may be explained by the fact that the larvæ, as a rule, live in more hidden situations, and are more difficult to find than the imagos. But crows derive a great deal of their food from the insects living in dung-heaps and dead animals where Dipterous and other larvæ abound; still these are but rarely met with in the stomachs. A marked exception to this rule is the frequent occurrence of spiders, and more especially species of the family Lycosidæ, or ground spiders.

"4. It would seem that crows have a predilection for insects possessing a pungent or otherwise strong taste or odour. This is exemplified by the prevalence of Carabidæ (among them the often-recurring genus *Chlœnius*, possessing a peculiar odour), coprophilous or necrophagous Coleoptera (Silphidæ, Histeridæ, and Scarabæidæ Laparosticti), ants, and more especially by the almost constant occurrence of certain species of the Heteropterous family Pentatomidæ."

If, therefore, the naturalists of any country by research prove certain things in reference to their own species of common crow, it may be assumed with a good degree of certainty that the same things are true of the common crow of other countries, and herein lies the value to Australia of some recent most elaborate studies of the common American crow undertaken by the Department of Agriculture at Washington.*

These investigations, which consisted chiefly in the examination of the contents of about 1,000 crow stomachs, have been in progress for over ten years, and have engaged during that time more or less of the attention of about a dozen specialists. The very much abbreviated report covers 100 pages similar to this, and is replete with useful and accurate information, and it would be difficult to point out a better recent illustration of the fact that such investigations should not be prosecuted hurriedly. The work of these men has attained the dignity of a normal growth, and has none of the forced ill-considered appearance which often characterises recent official productions, and the evidence they bring forward justifies a final conclusion respecting the economic status of the American crow, and, incidentally, it may be added, of the Australian crow.

Since the detractors of the crow were first in the field, it is fair that they should present their case first, and what does it amount to? We shall see.

A traveller struggles wearily across the Australian desert. He is bushed, exhausted, and without food and water. Attracted by his feeble movements and the odour of his feverish breath, the crows watch him narrowly, follow him incessantly, and the poor fellow may well fancy he hears in their cries his death knell. He falls, and almost before his death struggle ceases the crows are upon him and have picked out his eyes. I am fond of discussing with people the qualities of the crow, and I dare not say or venture to estimate exactly how many times I have heard this harrowing tale. I have certainly heard it so often that, if I did not know better, the prevailing impression left on my mind would be that a large number of people had been eye-witnesses to such a tragedy, and had survived to tell the tale. I am reminded of the man who, when asked if he had ever been in a battle, replied, "Yes, often," and that he had been killed several times.

Even admitting that such a tragedy has occurred, and there can be no doubt that something similar has on very rare occasions happened, is it greatly to the discredit of the crow that he picks out the eyes of corpses exposed in the open air? Divest the matter of sentiment, and what remains that inculpates the crow more than the ants that crawl into the eyes and nostrils, or the carrion-flies, and beetles, and a score of other organisms that prey upon the carcase after as well as before burial? Yet these others are not anathematised as is the crow. To make out a case against the crow it would be necessary to show that he plucks out the eyes of the living, and of this there is little, if any, authentic evidence.

Though the crow may so fear the human form as to leave it untouched until after death, it is not so with that of the sheep. Let a sheep sicken and become weak, or get bogged, or otherwise helpless, and he will sometimes be beset by crows anxious to pick out his eyes and feast on his body—even before he is dead. This performance is held up as a case of unexampled cruelty. It is a curious compliment to the intelligence of the crow that mankind often involuntarily assign to him human feelings and attributes. The simple fact is that this act, which would be an unspeakable atrocity if committed by a human being, becomes, when committed by a crow, no more culpable than the bolting by him of a grasshopper. One act is no more cruel than the other. It is, therefore, only necessary to consider how often the act occurs, and what is the monetary loss. As a matter of fact, it is a relatively uncommon occurrence, and the loss trifling. In most cases the sheep would die anyhow; the crows simply hasten the process. From inquiries I have made, I believe it would be hard to get evidence conclusively establishing even one hundred such cases. Nevertheless, the story of one such case is so revolting that it stays in the memory and is repeated from person to person until its notoriety becomes widespread.

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*"The Common Crow of the United States," by Walter B. Barrows and E. A. Schwartz, Washington, Govt. Printing Office, 1895.

The crow steals the eggs of poultry. He may occasionally be seen sitting quietly in some tree not far from the fowl-run, to all appearance merely having a quiet "loaf;" but you may rely upon it he has more business on hand than appears on the surface. He is keeping an eye (two eyes, in fact) fixed on the movements of the fowls, and no sooner does a laying hen leave her nest than he silently swoops down after the egg, and slyly and quietly disappears with it impaled on his beak. The eggs of ducks, turkeys, and wild birds are stolen in the same manner.

Young chickens, ducklings, and goslings are carried off by crows unless carefully tended by their mothers, as has been described by Dr. Godman.

The crow pulls sprouting grain. Early some morning a flock settles on the unprotected field of maize, and pulls up and eats a large number of the sprouting grains, which of course necessitates expensive replanting. This is the crow's greatest crime against the ordinary farmer, for though the crow steals corn in the milk, as well as ripe grain, these latter thefts are losses that are trifling, and are borne with equanimity.

Finally, the crow destroys cultivated fruit. He is sometimes partial to such fruit as apples, figs, and especially grapes, and takes a few to slake his thirst on a hot day, or perhaps to make up for his failure to find something he likes better. I say finally, for I intend to overlook the grievance a large number of people find in his so-called insulting voice and demeanour. It seems to me that nothing short of a consciousness of deserving contumely can construe the caw of a crow into a personal affront, and that anyone who feels keenly insulted by a crow had better at once institute an inquiry into his own moral welfare.

These, then, are the charges against the crow;—that it destroys fruit, corn, eggs, and young of poultry and birds, and that it worries sheep and hastens the death among them of the unfortunate and weak. Now let us hear what the American tribunal of specialists has to say after ten years of careful and impartial investigation. Mr. C. Hart Merriam says, in his letter transmitting the report on the crow:—

"The present report is based on the examination of the contents of nearly a thousand stomachs. The quantity and quality of the evidence seem sufficient to justify a final conclusion respecting the economic status of the crow, although a larger number of stomachs from some parts of the country would have been acceptable.

"The most important charges brought against the Crow are: (1) That it pulls sprouting corn; (2) that it injures corn in the milk; (3) that it destroys cultivated fruit; and (4) that it feeds on the eggs and young of poultry and wild birds.

"All of these charges are sustained by the stomach examinations, so far as the simple fact that Crows feed upon the substances named. But the extent of the injury is a very different matter.

"In order to ascertain whether the sum of the harm done outweighs the sum of the good, or the contrary, the different kinds of food found in the stomachs have been reduced to quantitative percentages and contrasted. The total quantity of corn eaten during the entire year amounts to 25 per cent. of the food of adult Crows, and only 9·3 per cent. of the food of young Crows. Leaving the young out of consideration, it may be said that in agricultural districts about one-fourth of the food of Crows consists of corn. But less than 14 per cent. of this corn, and only 3 per cent. of the total food of the Crow, consists of sprouting corn and corn in the milk; the remaining 86 per cent. of the corn, or 97 per cent. of the total food, is chiefly waste grain picked up here and there, mainly in winter, and of no economic value.

"In the case of cultivated fruits the loss is trivial. The same is true of the eggs and young of poultry and wild birds, the total for the year amounting to only 1 per cent. of the food.

"As an offset to his bad habits, the Crow is to be credited with the good done in destroying noxious insects and other injurious animals. Insects form 26 per cent. of the entire food, and the great majority of these are grasshoppers, May-beetles, cutworms, and other injurious kinds. It is shown by Mr. Schwarz that during the May-beetle season, in May and June, these beetles form the principal insect food of the Crow. Only a few stomachs do not contain them, and stomachs are often filled with them. The fact that the May-beetle season coincides with the breeding season of the Crow is of special importance, the principal insect food of nestling Crows consisting of these beetles. Mr. Schwarz also finds that grasshoppers occur in the stomachs throughout the year; that during the May-beetle season they occur in the vast majority of stomachs, but usually in moderate numbers; that with the disappearance of May-beetles toward the end of June they increase in number until in August and throughout the fall they constitute by far the greater part of the insect food, often occurring in astonishing numbers, and often forming the only insect food.

"To the same side of the scale must be added the destruction of mice, rabbits, and other injurious rodents by the Crow.

"In summing up the benefits and losses resulting from the food habits of this bird, it is clear that the good exceeds the bad and that the Crow is a friend rather than an enemy of the farmer."

This brings us face to face with the other side of the question, namely the benefits we derive from the crow,—and first of all he kills rabbits. As far as America is concerned*:—

"Remains of rabbits are common in Crow stomachs, particularly the common cottontail (*Lepus sylvaticus*) which must count the Crow one of its deadly enemies. It is not probable that adult rabbits are often attacked, but after the young begin to run about they are frequently pounced upon and carried away. On one occasion the writer saw a tragedy of this kind while driving along a Maryland road in June. A Crow suddenly sailed over the fence and alighted in the road about 100 yards ahead of the horse. As he lit, he struck savagely with his bill at some dark object on the ground which tried to escape by jumping from side to side, but the Crow followed each motion, striking quickly and heavily each time until the animal lay quiet, when, after a thorough pounding, the bird prepared to tear his quarry to pieces. Alarmed by the near approach of the wagon, he seized his prey in his bill and flew heavily over the bushes which fringed the road. Creeping to the fence I was able to identify the victim as a young rabbit, and subsequently found its tracks in the road at the point where the crow had attacked it. My companion said that usually he had seen young rabbits at this place in the road for a week past, but this was the first time he had seen one attacked by a crow.

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* Walter B. Barrows.

"Remains of rabbits occurred in 38 of the stomachs examined, and were most numerous in May, when they formed 3 per cent. of the entire food, 30 stomachs taken during the month containing an average of 37 per cent. of rabbits (flesh, bones, hair, and teeth). These were almost invariably young, usually less than half grown. Of course it is possible that some were dead, but by far the greater number must have been caught and killed. In stomachs taken in April and June remains of young rabbits occurred to a less extent, but at no other season were any found.

"A single stomach from Maryland, taken in December, contained remnants of an adult rabbit, and similar remains were found in a stomach from Argentine, Kans., collected in January. Mr. G. E. Stilwell, the collector of the last-named stomach, gives the following account of the capture of the rabbit by five crows. He says:

"On January 2, 1891, I was at a small station called Zarah, after rabbits and birds, and was crossing some rough, stony hills where the snow was 3 or 4 inches deep. When on top of one of the hills my attention was drawn to some crows making a great fuss about something, and so I crawled through the weeds and brush until I was in shelter of a stone fence and about 30 feet from the birds. I had a splendid view of the fight, which lasted about half an hour. The crows took regular positions, one as a sentinel on a low tree over the others, one on the stone under which their victim was hiding, and the other three would walk as if about to go under the stone. The rabbit would try to come out, only to be driven back by savage pecks from the bird on the stone. When he was finally dead they began to peck his head as if eating. I did not wait any longer, but secured the sentinel and one other.'

"Another correspondent, in Livingston County, Mo., mentions the fact that crows kill rabbits, but the habit seems to have escaped general notice, in spite of the fact that, as shown by the preceding table, rabbits enter more largely into the crow's diet than poultry and eggs, of which he is supposed to be particularly fond."

Briefly, it may be added that the facts are similar in Australia. Though I am unable to give such extensive data as the American investigators have obtained, I can say that I have found the remains of rabbits to be not infrequent in the stomachs of Australian crows. I believe, however, that in most cases observed by me this food was from the carcases of rabbits killed by eagles. It is uncommon in many parts of Australia to see an eagle feeding without a fair attendance of waiting crows, who, when his majesty has finished his repast, compete for what has fallen from his table, and inasmuch as the eagle is a great hunter of rabbits, many remnants of these animals must in this manner find their way into the stomachs of crows. Still, I have no doubt it could be shown that our crows capture and kill young rabbits in the same manner as do their American relatives, though I do not happen to have seen or heard of such instances.

The remains of mice are found in the stomachs of crows, and it would seem, according to Mr. Barrows, that our sable friends are very fond of those little pests.

"Not in early spring alone does the crow hunt for the nests of field mice; he is always on the lookout for them, especially during the late spring and summer, when they are more likely to contain young. The crow's habit of searching for food on the ground, and particularly of poking his bill into bunches of dead vegetation, and under the roots of grasses and weeds in pastures and meadows, favours the discovery of these nests. Others are exposed by the mower, and constitute one of the many attractions that draw crows to the hay field. Crow stomachs taken in July contain about four times as many mice as those taken in June. In meadow lands the mice and their nests are well hidden in June by the luxuriance of the grass, while in July they are exposed when the grass is cut. Besides the meadow mouse or vole (*Microtus*), remains of the common house mouse (*Mus musculus*) were found in many stomachs, and in several cases, bones, teeth, and fur of the white-footed mouse (*Peromyscus*) occurred. In one instance four young crows from a brood of five had been fed on a jumping mouse (*Zapus Hudsonius.*)

"In thickly settled districts most of the other natural enemies of mice—hawks, owls, foxes, skunks, and weasels—exist only in small numbers, if at all, and the increase and spread of the house cat only supplies their places in part, and that at the sacrifice of vast numbers of small birds, to which the cat is extremely partial. The capture of each living mouse by the crow is therefore an act of positive benefit to the agriculturist, and must be given due weight in trying to ascertain the crow's economic status.

"Crows in captivity evince the greatest relish for mice; in fact it is doubtful if any other article of food is so attractive. Even newly caged crows, which refused to eat other food of any kind while watched, laid aside all fear when a mouse was shown them, and would crowd up to the bars and even take the mouse from my fingers, pecking savagely at each other in their eagerness to secure sole possession of the coveted titbit. This experiment was repeated many times and with different crows. It seemed impossible to gorge a crow to such an extent that he would refuse a mouse. When a single mouse was given to several crows the fortunate one that secured it was compelled to swallow it whole in order to prevent the others from seizing it, but he invariably disgorged it later and pulled it to pieces. Subsequently the hair, teeth, and some of the bones were disgorged as a pellet, precisely as with hawks and owls, although in some cases most of the bones were ground up and entirely digested. It seems probable that this is rendered possible by the large amount of sand or gravel habitually swallowed after every meal, and the great muscular power of the stomach, which is practically a gizzard."

It is when we come to consider the crow as a destroyer of insects, and especially of grasshoppers, that we are forced to concede that he is of very great benefit to man. During the last four years, I have frequently observed the food habits of the common Australian crow, and though my work in this connection has been only incidental to an examination of the internal parasites of the bird, yet I am able to give some interesting and useful statistics concerning the food found in the stomachs.

I was much struck on one occasion, in the spring of 1894, by the immense amount of good done by crows in the Moss Vale District, through their destruction of grasshoppers. For weeks crows were very abundant throughout the vicinity mentioned. I made an effort to estimate their number, but am almost afraid to give the result, so high does it seem. Armed with a telescope, I mounted one of the highest hills, and found that in all directions the cleared land was about equally covered by crows. I say covered, meaning that every paddock, nearly, contained one or more large flocks, varying in size from a few dozen to upwards of a thousand; and I may here remark that a thousand crows do not make a great show, especially when feeding on the ground, which is about the only occasion on which one can make anything approaching an accurate estimate of their numbers. From what I could see, I estimated that the Moss Vale District at that time was supporting not less than a quarter of a million crows; in fact, it is my belief that the actual number was much greater than this estimate.

For several weeks these crows were feeding almost exclusively on grasshoppers from half an inch to an inch long. From numerous counts I am satisfied that the average number of grasshoppers in each stomach examined by me was very little, if any, short of 100. How many times a day the stomach was filled is a matter for conjecture, but as early in the morning the stomachs were always empty, or nearly so, there can be no doubt that it was at least once a day, and I have no hesitation in saying, nor would anyone who saw them feeding, have any hesitation in saying, that twice a day would be a moderate estimate. We thus arrive at the conclusion that each crow was devouring two hundred grasshoppers per day. Even one hundred per day gives for all the crows in the district a total of twenty-five million grasshoppers per day, and as this lasted for about a month, we may put the total destruction of grasshoppers at about seven hundred and fifty millions. This number is almost impossible of comprehension, and it will, therefore, be better to reduce it to pounds or tons. If we say that each grasshopper weighed only two grains, which is a very low estimate, the total weight of seven hundred and fifty million grasshoppers is about one hundred tons. That even this figure fails to give a clear idea of the good done by the crows, I will now proceed to show.

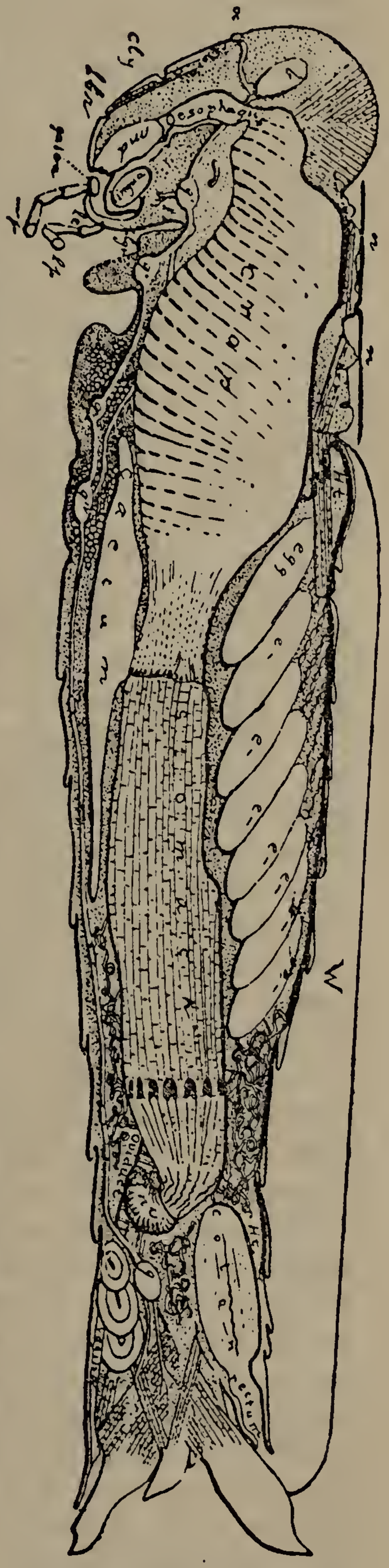

Fig. 1.—Median longitudinal section of a Grasshopper (*Caloptenus femur-rubrum*, De Geer), drawn by the author fifteen years ago from his own dissections, and inserted here to show the relative size of the digestive canal, which would be about the same for Australian species.

KEY ....
oc, central ocellus. *md*, mandible. *Ht*, heart.
cly, clypeus. *m*, mentum. *e*, eggs.
lbr, labrum. *b*, supra-œsophageal ganglion. *int*, intestine.
mp, right maxillary palpus. g^{I}, infra-œsophageal ganglion. *g*, cross-section of intestine.
lp, right labial palpus. g^{II}, g^{III}, g^{IV}, thoracic ganglia. *w*, wing.
plgr, palpiger. *n*, notum.
Galea, lingua, œsophagus, crop, stomach, caecum, colon, rectum, oviduct, and vagina as shown. Malpighian tubes much coiled near posterior end of stomach.

As anyone knows who has made the necessary dissection, the stomach of a grasshopper is relatively large, in truth the mere voracity of the insect is a sufficient testimony to this fact. Probably the contents of the stomach constitute more than one-tenth the entire weight of the insect. Allowing, then, that he fills his stomach twice a day, the grasshopper will consume his own weight in five days at the outside. Allowing his weight to be one, two, and four grains for the first ,second, and third month of his life respectively, he will consume, in three months, forty-two grains of food. On this moderate basis, the seven hundred and fifty million grasshoppers, if not killed by the crows, would have consumed *over two thousand tons of grass and other fodder.*

In other words, during the single month I have mentioned, the crows saved thousands of tons of grass and other produce to the inhabitants of Moss Vale through the destruction of grasshoppers. Surely, in the light of these facts, we may well spare a few sheep and chickens without complaining.

This is not an isolated case; on the contrary, something similar is of annual occurrence in various parts of the country. Wherever grasshoppers become unusually numerous, crows soon congregate to fatten on this their favourite food. A noticeable feature of the locust plague in the western and north-western parts of New South Wales in 1891 was the presence, in parts of the infested districts, of large flocks of these black police. Even in seasons when grasshoppers are only ordinarily numerous, their number is much reduced by the crow, and the good done in this way should not be overlooked.

Early in the season, before the appearance of grasshoppers, particularly during ploughing time, the crow does the farmer another good turn, for he may very often be seen following the plough for hours at a stretch, busily picking up grubs that would otherwise remain to injure the following crop. Both white grubs and cutworms are cleared off in large numbers by this means.

It is only necessary to imagine what would happen if the grasshoppers and cutworms were not kept in check in such a case as that at Moss Vale in 1894 to realise the debt we owe to the crow. Suppose, for instance, the crows to have been all killed off on that occasion, and the insects to have been given full swing. Soon there would have been bare paddocks, half-starving stock, desolated gardens, and possibly a dearth of fruit; for there is hardly anything in the way of crops the grasshopper will not eat, and when driven for food, he does not despise even such articles as wood and cloth. Indeed, it is not necessary to suppose such a case, for something of the sort has actually occurred. Previous to the year 1750, in consequence of the premiums paid for killing crows and blackbirds in the colony of Massachusetts, these birds became so nearly extirpated that they were rarely to be seen, and the traveller Kalm wrote:—

"But as, in the summer of the year 1749, an immense quantity of worms appeared on the meadows, which devoured the grass and did great damage, the people have abated their enmity against the maize thieves, for they thought they had observed that those birds lived chiefly on these worms before the maize is ripe, and consequently extirpated them, or at least prevented their spreading too much."

Here, at least, is a case of widespread belief among an intelligent people that the worms and so forth, that destroy grass, were so greatly increased in consequence of the extirpation of crows and birds of similar habits that the hay crop was ruined; and it may be added that recent investigations tend to show that the opinion was entirely correct.

It must not be concluded that because I have given such prominence to the destruction of the grasshopper, the white grub, and the cutworm by crows that they destroy these insects only. Dung-beetles are eaten by them, as well as "June-bugs," weevils, ants, borer-beetles, click-beetles, and crickets, all of which are more or less injurious.

How the Crow should be treated.

In my opinion the crow should not be the subject of legislation. To make it an offence at law to kill a crow would be to put, at least, a nominal restriction on the destruction of such crows, for instance, as contract the habit of stealing eggs and chickens, and this would be unwise, even if the law were not enforced, and the restriction, therefore, merely nominal. Again, the shooting or poisoning of the bolder crows that pull sprouting grain or steal fruit is so obviously commendable that the law should not interfere with the farmers' efforts in this direction.

On the other hand, so useful a bird should not be outlawed. As a matter of fact, it makes very little difference if he is, for he is eminently well able to take care of himself, and any bounty sufficient to pay for the trouble of extirpating him would probably bankrupt the State. Considering the difficulty of shooting or entrapping him, 6d. per head would be no great attraction to hunters, and at this rate it is doubtful if this Colony is able to pay for all the crows within its borders.

The most reasonable way to deal with our sable friend is to frighten him away from places where he is liable to do damage, but otherwise to let him alone. There are many devices for keeping him at a distance, and a list of them will not be out of place here.

1. *Scarecrows.*—Probably no object for frightening crows is more familiar than some imitation of a man placed in the midst of a field of corn. These humorous figures are too well known to require description. They have found a corner in the lore and literature of most of the peoples of the world, and also, no doubt, in the traditions of the birds themselves, if they have traditions. A tradition handed down from cock to fledgling of the brood of birds " born and brought up in the very hat of the identical scarecrow " set up to intimidate them, hardly requires a stretch of the imagination. It is certain that the birds soon see through this trick, and take the greatest liberties with the person of the scarecrow, alighting on his arms and head, and carrying off pieces of his clothes for nest linings. Still, the scarecrow is not a failure, and even if he were, one would be sorry to see him become extinct.

2. *Windmills.*—Toy windmills are easily made, and are effective in frightening birds so long as the wind blows, but unfortunately when the wind stops the mills follow suit, and at such times the birds become accustomed to them, and no longer fear them, even when in motion. The windmills are most effective placed near, or even on a scarecrow, this combination, for a time at least, forming a terrifying mystery that is beyond the bird's ability to fathom.

3. *Pendant Tins.*—Sheets of bright tin or bright tin-cans hung from poles by a string, so as to sway and revolve in the breeze, make a good defence against feathered thieves, especially if arranged so as to rattle.

4. *Poles and Strings.*—White cotton twine strung round and across a field on poles eight to ten feet high appears to have such a mysterious and snare-like look as often to prove highly effective in keeping crows at a distance.

5. *Feeding.*—It has been found that where crows are in the habit of pulling grain the damage may at very slight cost be much lessened by sowing some grain on the surface of the ground. Birds are astonishingly quick-sighted, and they at once discover and feed upon the grain thus offered them, so that

they pull much less. Grain thus sown on the surface should be first soaked in water, and should be sown on the side from which the crows usually approach. A bushel of grain sown in this manner, a peck at a time, and at intervals of a few days, at the critical season, is a very good investment.

6. *Poison.*—Grain that has been pickled for at least twenty-four hours in a concentrated solution of common white arsenic (arsenious acid), or in any other tasteless strong poison, will be eaten by crows if sown on the field where they are pulling recently-sprouted grain. The intelligence of the birds is well illustrated by the fact that after one or two such doses, causing the death of a few of their number, they will generally avoid the field for some time, and occasionally will forsake the vicinity in a body.

7. *Tarred Grain.*—Grain that has been given a coating of gas-tar, or any similar substance, is offensive to crows, and after pulling a little of it they give it up as a bad job. The method of tarring is as follows:—Soak the seed overnight. Spread it out and stir until the surface of the grains is somewhat dry. Mix tar and grease so as to form a thin and soft mixture when warm. Add warm slaked lime until the mixture is well thinned and perfectly liquid. Stir in the corn, and as soon as it has received a coating, remove it and plant it. The flavour of tar will be retained by the grain for several weeks, or until it is too large to be easily pulled by the birds. Any sort of tar answers the purpose. Long soaking in the tar mixture will kill the grain.

These methods of dealing with crows, combined with shooting some of the boldest of them, are quite sufficient to keep them from doing any considerable amount of mischief, and leave them at most seasons to assist in keeping grasshoppers and other injurious insects in check, and be assured their efforts will be more effective than any devices yet known to man.

Just consider for one moment the helplessness of man before the advance of a plague of grasshoppers. Day by day the young hoppers issue from their breeding-grounds, and in countless numbers make their way over the country on foot or by flight, eating every green thing. To-day the country is flourishing,—to-morrow the plague passes by, leaving desolation, and often ruin, in its path! One who has not experienced it cannot imagine the feeling of utter gloom wrought by such a visitation. Nothing will avail against it. All the spraying experts in the country may fire insecticides by the ton into such a mass of insects without any appreciable effect. It would be like Mrs. Partington trying to keep back the Atlantic Ocean with a mop.

The fields of nature are, however, patrolled by a feathered police, whose function it is to keep this destructive insect in check, and if man does not interfere with these friendly watchmen, locust plagues will be much fewer, farther between, and less destructive when they do occur, while the ravages of ordinary seasons will be kept at a minimum.

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